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COMPARING DIFFERENT TYPES OF PROFESSIONAL PRATITIONER ENGAGEMENT IN AN INTEGRATED DESIGN ENGINEERING DEGREE

Omitted for Review
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Keywords: professional practitioners, Engineering Design, studio-based projects, learning outcomes

ABSTRACT SUMMARY

Design engineering education is a process that needs to happen in close collaboration with industry, since the latter is the final destination of most graduates in their professional life. For this reason, early engagement with 'real' practitioners is crucial to benefit educational outcomes. Although much research has been done comparing the skills and approaches of engineering design students and professional practitioners, (e.g. [1] and [2]) little research to date has looked in detail at how this engagement affects the educational process and outcomes. In this study, we evaluate the impact professional practitioners had on the learning process and the delivery of learning outcomes for a number of units in a specific Integrated Design Engineering (IDE) course.

The IDE course is a collaboration between Departments of Mechanical Engineering (MechEng) and Electrical and Electronic Engineering (EEEng) aiming to create multidisciplinary design engineers of the future. Students from both departments can join after two years of discipline specific studies (MechEng or EEEng) and then complete two years to attain an MEng in IDE. As part of the latter two years there are five mandatory Design-Make-Test (D-M-T) units. The units are run in a short, intensive fashion (4 weeks duration) with coursework-only assessment in team-based open-ended project work. In the vision for the creation of the course, much inspiration came from our own Department of Architecture. In architecture education, the engagement of professional practitioners is common for studio-based units. Their education approach has been studied. For example, Schön [3] developed the concept of the 'reflective practitioner' by studying - amongst others - professional architects and he later translated his concepts of professional competence into important advice for teaching and learning [4].

The five units in this study offer a broad spectrum of professional practitioner engagement, from 'no involvement' to the practitioners developing, delivering and assessing elements of the unit. The units (name/year-level of involvement) are: User Centred Design (3-High), Mechatronic Design I (3-Low), Reverse Engineering (3-Medium), Mechatronic Design II (4-None), Design Optimisation (4-Medium).

To create the comparison for this study the same cohort of students - 16 in number - is used that have attended all units. In order to compare the impact of the practitioners' engagement across the 5 cases we used 3 types of data: the anonymous feedback from the cohort via surveys of "Start, Stop, Continue" (SSC) that run at the end of each unit; the official feedback survey of the University (quantitative and qualitative); and focus group feedback.

The paper therefore reports on the students' reflections on how the practitioner engagement affected their learning process and learning outcomes. The analysis of the case studies is done using thematic analysis which identifies the commonalities and differences between the 5 different cases.

Some initial results of this comparison indicate that students see the practitioners as 'external clients' for their design work and consequently strive harder for their final presentations; and contrary, students are critical when the practitioner engagement distracts from the deliverable they are working on. The highest level of practitioner engagement (user centred design) has been the most transformative in their learning outcomes. However, more studies are needed to tease apart to what extent this is related to the topic versus the level of practitioner engagement.

[1] Atman, C.J., et al., 2007. Engineering design processes: A comparison of students and expert practitioners. Journal of engineering education, 96(4), pp.359-379.

[3] Schön, D. (1983). The reflective practitioner: How professionals think in action. New York: Basic Books.

[2] Cash, P.J., et al., 2012. A comparison of the behaviour of student engineers and professional engineers when designing. Proceedings of DESIGN, International Design Conference, Dubrovnik, (pp. 757-766).

[4] Schön, D. (1987). Educating the reflective practitioner : Towards a new design for teaching and learning in the professions (The Jossey-Bass higher education series). San Francisco: Jossey-Bass.